Waste Storage Device

The invention relates to a waste storage device for example storing waste such as nappies.

One known waste storage device is disclosed in GB Patent No. 2206094 (incorporated herein by reference) and described here with reference to Fig. 1. The device is particularly useful for the storage for subsequent disposal of waste such as babies' nappies or other personal waste material. A plastics container 21 is formed with an internal flange 22 from which a cylinder 23 extends upwards. A pack consisting of a tubular core 1 inside a profusely circumferentially pleated length of flexible tubing 2 is located in the container 21 with the core 1 resting on the flange 22 and rotatable on the cylinder 23. To begin using the pack to form a series of packages of objects, which in this particular example will be considered to be babies' disposable nappies, the top of the flexible tubing 2 is pulled upwards and tied into a knot 24. This closed end can then form the bottom of a package to be formed along the length of part of the tubing. This is effected by pushing the closed end downwards inside the core 1 and cylinder 23 by the object to be packaged. As this is being done the flexible tubing 2 from the pleated length slides over the top edge 25 (Fig. 1) of the core 1 which is made sufficiently smooth to prevent the flexible tubing from being damaged. The core 1 may be approximately four inches (10.16cm) diameter but, of course, the diameter of the flexible tubing 2 is substantially more than this.

When the object has been thrust well into the concentric core 1 and cylinder 23, the package is closed by twisting the flexible tubing 2 above the object as at 30 (Fig. 1). This is done by turning the core 1 with remaining pleated tubing thereon about the core axis. A unit 31 is formed for this purpose in that it has a depending annular flange 50 formed with an outer surface that is a taper fit in a frusto-conical inner surface 51 at the top of the core 1. The package is

prevented from turning about the axis of the core during this manual twisting action by springs 52 fixed to the container 21 and projecting radially inwards to engage the package. These springs are equidistantly spaced round the container 21. Shallow grooves dividing upwardly extending ridges are formed on the frusto-conical inner surface 51 to stop slippage of the flexible tubing during the twisting operating.

By the aforesaid means, a series of connected closed packages 35 are formed and this can be continued until the pleated tubing 2 is exhausted. In the arrangement of Fig. 1 the packages collect in a bin portion 36 of the container closed at the bottom by a hinged base 53 normally held closed by a manually operable catch of suitable type. When it is desired to remove the packages from the bin portion 36 for transport to a waste disposal facility, the uppermost package is severed above its upper twisted closure 30 and the hinged base 53 opened for the removal of the packages through the end of the bin portion. Even if the twisted seals between the packages become loosened, the lid and the newly formed topmost twisted seal with prevent the escape of odours, vapours and gases to the ambient atmosphere. However, it has been found that when the tubing 2 is made of high density polyethylene the twisted joints remain remarkably tight.

A development of this arrangement is disclosed in GB 2292725 (incorporated herein by reference) and described here with reference to Fig. 2. It will be seen that an outwardly flared funnel 12 having an inlet edge 15 is detachably connected to the top of the core 1 by a taper joint 16. The funnel improves the hygiene of the device yet further because the flexible tubing 2 is drawn from the pack as an object is pushed down, over the inlet edge 15 of the funnel 12 to present a fresh and hygienic layer of tubing in the flared part of the funnel. The funnel 12 is twisted to obtain the twisted closure 30. An alternative spring arrangement 14 is shown in Fig. 2 and described fully in GB 2292725.

GB 2206094 and GB2292725 both additionally disclose a cutting arrangement for severing the tubing when it is desired to remove the packages for disposal. Referring to Fig. 3, the severing means is incorporated in the unit 31 which is a bipartite unit comprising an outer ring 55 formed with a flange 50 that locks into the top of the core 1 or funnel 12 and a disc 56 which is freely rotatable in the ring 55. The disc 56 comprises a circular transparent sheet 57, through which the user can see the twisted flexible tubing, set in an angle section ring having a horizontal flange 58 and a vertical flange 59 (Fig. 1) located between narrow flanges inside the relatively stationary flange 50. In the angle of the ring 58,59 three finger pieces 60 are fixed 120° apart above the transparent sheet 57. A cutter unit 61 is fixed beneath the flange 58. This device has an upper arcuate part 62 and a lower tapered shoe 63 with a gap between them along the major portion of their length. Close to the closed termination of this gap a metal cutter blade 64 is fixed as close as possible to the relatively stationary flange 50 so that the blade is shrouded against doing any damage to a person's fingers when the lid 31 is removed. The predominant material for the lid may be plastics material or metal.

To operate the cutter unit 61, the disc 56 is turned by means of the finger pieces 60 or any other suitable finger pieces through a full revolution. In this movement the tapered shoe 63 pierces through the radially pleated taut portion 65 of the flexible tubing that flares outwards from the topmost twist 30 to the core 1. Further rotation of the disc 56 causes the cutter blade 64 to cut round the tubing material, cleanly separately the uppermost package from the flexible tubing remaining on the core 1. The cutter unit further includes a finger releasable detent operable at 120° intervals.

In a further improvement, WO99/39995 (incorporated herein by reference) describes a cutter of similar type to that described above with reference to Fig. 3 but formed intergrally with a hinged lid for a waste storage container. The

hinged lid swings down to close the container and as a result the cutter automatically engages the tubing allowing a simplified cutting arrangement.

Various areas for further improvement exist in relation to the known devices. Twisting of the tubing is done manually and requires direct contact of the user's hands with the tubing which can be undesirable even with the funnel arrangement described above. The existing spring arrangement for holding the tubing against rotation in some instances provides insufficient user tactile feedback as to whether a package is securely held by the springs. In addition the packaging can be held unevenly tightly around its circumference as a result of which the cutting operation can be impaired. Furthermore packages suspended beneath the springs can untwist, removing the individual seals between packages.

With the existing cutter design it can be unclear whether a full cut has been achieved without repeated checking and there is also a risk that the cutter will be rotated in the wrong direction.

With regard to the cassette design it is found that a range of different cassettes are required for different container formats. In addition it is desirable to minimise the resistance to rotation of the cassette.

The invention is set out in the attached claims.

Embodiments of the invention will now be described, by way of example, with reference to the drawings, of which:

Fig. 1 is a partially cut away side view of a device of known type;
Fig. 2 is a partial sectional side view of another device of known type;

Fig. 3 is an underneath plan view of a cutting device of known type;

Fig. 4 is a cross-sectional view of a waste storage device according to the present invention;

Fig. 5 is a cross-section of a rotatable disk for rotating a cassette according to the present invention;

Fig. 6 is a cross-sectional view of the rotatable disk of Fig. 5 carrying a cassette;

Fig. 7 is a cross-sectional view of a cutter and lid according to the present invention;

Fig. 8 is a perspective view of a detail of the lid and cutter assembly according to the present invention;

Fig. 9 is a plan view of an upper, gripping diaphragm according to the present invention; and

Fig. 10 is a plan view of a lower, guide diaphragm according to the present invention.

In overview the invention provides an improved waste storage device and cassette. The waste storage device carries an outer rotatable disk with a user grip portion. The rotatable disk engages the cassette so that the cassette can be manually twisted or rotated without the need to touch the cassette itself or the tubing and with minimum difficulty.

The twisting operation is yet further improved by replacing the springs in conventional versions with an annular upper gripping diaphragm having a central aperture. As a result the package is held firmly and continuously around it periphery against twisting such that individual packages are more efficiently sealed. It is also found that this arrangement provides better user tactile feedback and holds the tubing more firmly allowing improved cutting. A further, lower guide diaphragm includes a central aperture defining a

triangular flap directed towards a wall of the container such that as a package is passed through the aperture it is pushed towards the side of the container and held against it so the tubing does not untwist in the lower part of the container.

The cutter is provided in the lid but includes a single rotational detent which engages after each 360° turn so that the user can identify when one full twist has been carried out representing a full cut. Yet further the cutter has a ratchet arrangement such that it rotates only in the cutting direction.

In a further improvement the cassette is designed to suspend from an annular flange around its outer cylindrical wall as a result of which it can be mounted in plurality of different types of container formats, and also provides low frictional resistance to rotation.

Referring to Fig. 4 the device can be seen in more detail. The basic operation is as described above with reference to Figs. 1 to 3 and will not be discussed here in detail to avoid duplication. Similarly common reference numerals denote common parts. The device includes a container 21 in which a cassette 1 is mounting from which tubing 2 is drawn down over a funnel 12. The funnel 12 is a push fit into the cassette, providing a reliable interference fit. The top part of the tubing is shown schematically and transparently for ease of understanding of the drawing and it can be seen that the tubing contains packages 35 such as nappies separated by twists.

The device includes a rotatable spinner or disk 100 with a handle 102. The disk 100 is mounted for a rotation on an annular rim 104 of a formation on the container 21. The cassette 1 has an annular flange 106 around its outer wall resting on the shoulder 104 such that rotation of the disk 100 rotates the cassette to provide the twist in the tubing 2. In an alternative embodiment (not

shown) the annular flange 106 on the cassette rests on a formation in the container itself and the disk 100 includes formations such as lugs engaging co-operating formations such as notches in the cassette. In either event a simpler means of rotating the cassette, and with less resistance to rotation, is provided.

A hinged lid 70 is further provided on the container 21. The hinged lid 70 includes an integral cutter 57 which engages the tubing 2 against the funnel 12 when the lid 70 is closed to allow cutting of the tubing in the manner discussed above with regard to Fig. 3. The specific configuration of the cutter according to the present invention is described in more detail below.

The container further includes an upper gripping diaphragm 120 and a lower, guide diaphragm 122 mounted on appropriate formations on the container provided in a throat portion of the container 21 below the cassette and formed of flexible material. The upper gripping diaphragm 120 has a central aperture which can be for example circular or circular with lobes as discussed in more detail below and is arranged to hold a package against rotation of the cassette by the rotating disk 100. The lower guide diaphragm 122 has a V-shaped slit as discussed in more detail below ensuring that when a package 35 is pushed through it is directed towards, and engages the side of the container 21 to prevent rotation and untwisting. It will be seen that the diaphragm 122 directs the package 35 towards a side having an additional set-in inner wall or fluted portion 21a to facilitate contact with the package 35. It will be noted that the hinged lid, rotating disk, cassette and upper and lower diaphragms are all provided on a top portion of the container 21 which can be removed from a lower portion of the container 21 to allow removal of waste stored in the container 21. The two parts can be held together by any appropriate catch means, and optionally the catch also provides an integral handle for moving the container as a whole.

The rotatable disk and cassette assembly is described in more detail with reference to Figs. 5 and 6. The rotatable disk 100 includes an upper annulus 110 carrying a post upon which the handle 102 is mounted to spin freely for ease of rotation of the disk 100 by a user. An outer cylindrical wall 112 depends from the annulus 110, the lower face of which is supported on a support face of the container as can be seen in Fig. 4. An inner cylindrical wall 114 depends from an inner edge of the annulus 110 and has an inwardly projecting annular support flange 115 providing the shoulder 104 at its base supporting, as can be seen from Fig. 6, the cassette 1. The cassette 1 has an outwardly projecting annular flange or lip 116 on its outer wall resting on the support flange 115. In addition a lug 118 projecting from a lower face of the outer cylindrical wall engages in a recess or aperture 119 in the cassette 1 ensuring full rotational engagement. The recess 119 can, for example, also serve as a vent allowing air to escape when tubing is inserted into the cassette during the manufacturing process. Alternatively the cassette can carry a plurality of axially directed ribs around its outer periphery which engage with a co-operating lug or other formation on the rotatable disk 100. The upper annulus 110 can include a cutaway portion allowing the user to access the tubing to pull it out and through the central aperture of the cassette. The tubing may also carry colouring or another indicator at its lower end as an out-of-stock indicator to display to the user when it is nearly depleted.

Referring now to Fig. 7 the hinged lid 70 can be seen in more detail as including a disk-shaped rim portion 250 having an external downwardly curved peripheral lip 252 and a downwardly domed inner periphery portion 254 forming a central circular aperture having an inner generally horizontal annular flange 202 with an inner upwardly projecting cylindrical guide lip 204. The cutter 57 includes a handle portion 206 comprising a generally circular body

with appropriate grip portions (not shown) mounted rotatably against the hinged lid guide lip 204 and comprising a co-operating inner lip 208 engaging against the guide lip 204 to form a rotation guide. Depending from the handle portion 206 a cutter portion 210 comprises a cylindrical disk 212 with a shoe 214 projecting therefrom carrying a blade (not shown) as discussed in more detail above with reference to Fig. 3. Rotation of the handle portion 206 turns the cutter portion 210 relative to the tubing such that the shoe 214 catches the tubing 2 which rides up to the blade and is cut by continued rotation of the cutter. In an optimisation two blades and respective shoes are provided at 180° intervals around the cutter ensuring that the film is cut all the way around with a single turn of the cutter.

Referring to Fig. 8 a tamper proof tab 220 provided on the hinged lid 70 can be seen in more detail, viewed from the underside of the lid. The tamper proof tab 220 is resiliently mounted on the lid for example relying on the resilience of the lid material and biased upwardly against downward finger pressure. The tab 220 includes a tongue 222 arranged to engage a corresponding projection 224 on a lower, underside face 203 of the cutter handle portion 206. When the tab is depressed the projection 224 is disengaged allowing rotation of the cutter with the tab released until the projection 224 has rotated around 360° and provides a stop against the tab tongue 222. As a result a single 360° turn is permitted allowing the user to ensure that a full cut has been achieved.

In addition a ratchet-type arrangement is provided to ensure uni-directional rotation of the cutter handle portion 206. One way tab 226 is also resiliently biased against downward movement for example relying on the resilience of the material from which the lid and tab are formed. Accordingly in a rest position the one way tab 226 engages or is in close proximity to the lower face 203 of the cutter handle portion 206 allowing rotation of the cutter handle

portion. The projection 224 on the cutter handle portion additionally has a ramp face 228 and a detent face 230 to provide a ratchet. As a result if the cutter is rotated in the correct direction the one-way tab 226 rides over the ramp face 228. However if the cutter is rotated in the wrong direction then the one-way tab 226 engages the detent face 230 and prevents rotation in that direction. As a result the cutter can only be rotated in the cutting direction. It will be appreciated that the tab detent and ratchet mechanisms can be combined in a single element.

Referring now to Fig. 9 the upper, gripping diaphragm can be seen in more detail as comprising a main body 300 having a central aperture 302. The central aperture 302 can be circular or of any other appropriate profile and here it can be seen that the circular aperture 302 includes a number of lobes 304 such that the main body 300 has a plurality of projecting fingers 306 projecting into the aperture 302 effectively forming a continuous engagement face but providing additional flexibility. As a result the upper gripping diaphragm 120 provides a clear engagement feel when a package is inserted and held in place so that the user can detect by tactile feedback that the arrangement is ready to twist the tubing above the gripped package. Yet further the effectively continuous engagement face provided by the aperture periphery such as fingers 306 ensures that the tubing is gripped consistently around its circumference such that the cutting operation is performed more efficiently, less loose portions of the tubing being encountered by the cutter.

Referring now to Fig. 10 the lower, guide diaphragm 122 comprises a main body 400 formed of flexible material and including a V-shaped aperture 402 provided off centre to define a triangular flap 404 whose tip is near the circumference of the main body 400. As a result packages being pressed down through the aperture 402 are generally directed by the flap in the direction of its

tip towards the wall of the container beneath it. As a result the package is held against the container wall such that it will not untwist whilst suspended in the container. It will be seen that the aperture 402 defines a plurality of a fingers 406 which improve the flexibility of the arrangement and provide additional guides to the package being pushed through the diaphragm.

It will be appreciated that the device and components described above can be formed from any appropriate materials and in any appropriate manner. For example the majority of the parts can be formed from resilient or rigid plastics material, and the upper and lower diaphragms from flexible elastomeric material such as an elastomeric polymer.

Although discussion has been directed to provision of the waste storage device for storage of nappies, it will be appreciated that any appropriate waste such as hygienic waste or household waste can be stored and packaged as described above. Similarly the device can be used in any appropriate environment for example domestic, workplace, retail, public, hospital or care environments. Any appropriate detent and ratchet mechanism can be used for control of the rotating cutter portion. The rotating disk for rotating the cassette can be mounted and rotated in any appropriate manner and can indeed be formed integrally on an outer face of the cassette. The guide and gripping diaphragms can have any appropriately defined central aperture and be formed of any appropriate flexible or semi-flexible material.